Open Systems Architecture in DoD Acquisition: Opportunities and Challenges

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DASD, Systems Engineering Mission

Systems Engineering focuses on engineering excellence – the creative application of scientific principles:

- To design, develop, construct and operate complex systems
- To forecast their behavior under specific operating conditions
- To deliver their intended function while addressing economic efficiency, environmental stewardship and safety of life and property

DASD(SE) Mission: Develop and grow the Systems Engineering capability of the Department of Defense – through engineering policy, continuous engagement with component Systems Engineering organizations and through substantive technical engagement throughout the acquisition life cycle with major and selected acquisition programs.

- ***US Department of Defense is the World's Largest Engineering Organization***
- ***Over 99,000 Uniformed and Civilian Engineers***
- ***Over 39,000 in the Engineering (ENG) Acquisition Workforce***

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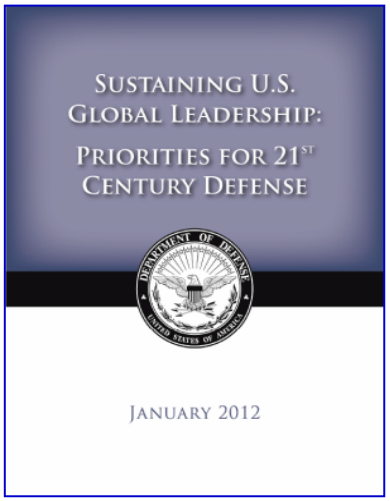
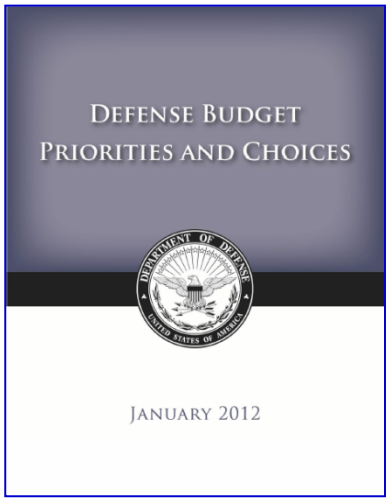
Key Elements of Defense Strategic Guidance





- **The military will be smaller and leaner, but it will be agile, flexible, ready and technologically advanced.**
- **Rebalance our global posture and presence to emphasize Asia-Pacific regions.**
- **Build innovative partnerships and strengthen key alliances and partnerships elsewhere in the world.**
- **Ensure that we can quickly confront and defeat aggression from any adversary – anytime, anywhere.**
- **Protect and prioritize key investments in technology and new capabilities, as well as our capacity to grow, adapt and mobilize as required.**

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2013 DoD Leadership Focus: Challenges, Choices, Opportunities

Chuck Hagel
24th Secretary of Defense
Sworn in February 27, 2013

- **<u>The challenges</u> posed by a changing strategic landscape and new budget constraints;**
- **<u>The choices</u> we have in responding to these challenges, and;**
- **<u>The opportunities</u> that exist to fundamentally reshape the defense enterprise to better reflect 21st century realities.**

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Challenges to the DoD Engineering Enterprise

- **Lay solid foundations…create opportunities**
- **Envision multiple futures…enable flexible choices**
- **Design and build systems with focus on lifecycle cost**
- **Protect our critical defense "intellectual property"**
- **Focus on "3 Ps" of the DoD Engineering Enterprise: Policy, Practice and, most importantly, People**

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Resilient Design

- **The only constant for DoD systems is change:**
  - Evolving threats
  - Strategic and Tactical Innovation
  - Rapid technological change
  - Increased Defense leverage of commercial systems
  - Resource and demand uncertainty
- **These factors all demand increased resilience – the ability to explicitly design military systems to have capacity to adapt and adjust to maintain relevance and operational advantage in an**

Open System Architecture is a key contributor to Resilient Design

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Defining Open Systems Architecture

What: *A technical architecture that leverages technical standards to support a modular, loosely coupled and highly cohesive system structure*

How: *Customer definition and ownership of product architecture; publication of key interfaces within the system*

Why: *Enables Open, Competitive Business Model – allowing components to be added, modified, replaced, removed or supported by different vendors throughout the life cycle – driving opportunities to enhance competition and innovation*

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DoD Interest in Open Systems Architecture

- **Drives risk-prudent competition**
- **Enables Business Architectures that mirror Technical Architectures**
- **Provides a constant battle rhythm of competition**
- **Levels playing field; reduces barriers to market entry**
- **Addresses obsolescence risk**
- **Promises wider access to innovation**

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Open Systems: Enabling New Business Models

Objective: Competition at the sub-system level

- **Government must be able to share:**
  - Design documentation, specifications, interfaces, tools, etc
  - Architecture definition
  - Established sub-systems boundaries that are defined, coherent and loosely coupled
- **Focus on what is needed for competition:**
  - Scale sufficient to attract competitors
  - Scoped to accept innovative offerings
  - Support for innovation through appropriate licensing of IP
- **Government must be a smarter buyer.**
  - Creates significant new demands on government in-house

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Open Systems Considerations in Development

Establish an Environment for

- Be clear about intent to compete/recompete
- Establish a flexible contracting approach
- Incentivize good behavior among contributing contractors

Focus Systems Engineering for

- Develop common architectures across a product line or across related
- Functionally decompose legacy capabilities

Leverage and Exercise Data

- Assess current and needed data rights
- Be a better customer: confirm that data rights restrictions are correct and assert data rights
- Use government purpose rights (GPR) for next competition

Explore Business Architectures and Sound Competition Approaches

- Inject OSA through technical insertions
- Consider alternative integrations concepts
- Insure incentives align with desired behaviors
- Reward reuse

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Balancing Potentially Conflicting Goals

Customer

- **Cost of Data Rights**
- **Typical Engineering Deliverables**

Vendor

- **Competitive Advantage**
- **Financial Return on Research Investment**

Use of Open Systems must be driven by a value-focused business case.

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Technical Data, Computer Software, and Intellectual Property Rights

- **Data rights are considered up-front when developing an acquisition strategy; if critical data and software are not be specified for delivery, they may be unavailable (or unaffordable) years later for use on a program during its sustainment phase.**

- **Some Technical Data Rights Strategy considerations:**
  - Data deliverables included in the RFPs and subsequent contracts
  - Data rights, including the responses to the contractor's data assertion lists
  - Data management approach including how the data will be delivered, accessed, maintained, and protected

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Diminishing Manufacturing Sources and Material Shortages (DMSMS): An Emerging Crisis

- **Likely impact of current fiscal environment:**
  - Fewer new-start development programs
  - More Service Life Extension Programs (SLEP)
- **Accelerating technology life cycles means fewer sources for "pin-compatible" replacement parts**
- **Driving SLEP cost and risk:**
  - Loss of OEM sources
  - Obsolete parts
  - Loss of component pedigree
  - Loss of key manufacturing expertise

Open Systems Principles Mitigate Much of DMSMS Risk

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Some OSA Challenges

- **Lack of key technical insight by government customers**
- **Risk of Government acting as integrator**
- **Inability to project long-term DoD plans = uncertain business cases**
- **Risk of architectural lock in**

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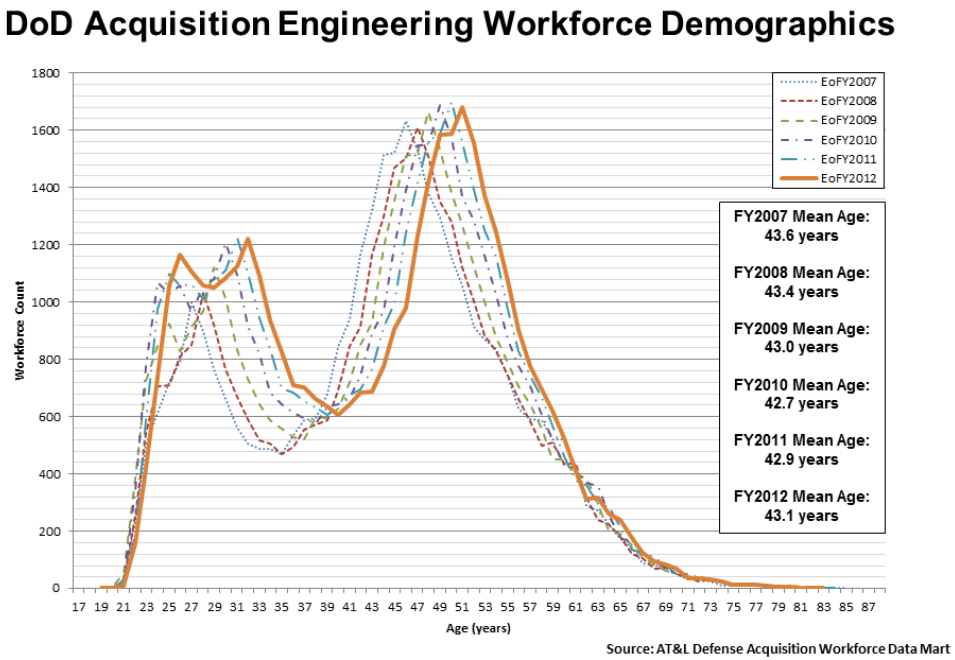
Defense Acquisition Workforce Readiness for OSA



Current fiscal uncertainty and government workforce pressures may impede adoption of OSA

- **Adequate capacity and capability in Defense engineering workforce**
- **Policy and practice supporting engineering design environment**
- **Department must be an informed user and have active participant in standards development**
- **Stable long term plan to support capturing ROI in OSA investments**
- **Successful OSA implementation creates technical demands on customer**

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Opportunities and Challenges

- **DoD is looking to innovative acquisition models to achieve increased efficiency and effectiveness**
- **Open Systems Architectures offer great opportunities to leverage sub-system- level competition to future-proof systems, provide a pathway for innovation and drive down cost over time**
- **Open Systems business models are dependent on detailed engineering designs that incorporate and define open systems architectures, standards and interfaces**
- **These designs will increase demand on DoD engineering competence, capability and capacity**
- **Adoption of open systems approaches should only be made where a well defined business case and acquisition strategy support this approach**

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Systems Engineering: Critical to Defense Acquisition

Innovation, Speed, Agility

http://www.acq.osd.mil/se

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